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August 27, 2001

LTR: BYRON 2001-0116  
File: 2.01.0700

United States Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

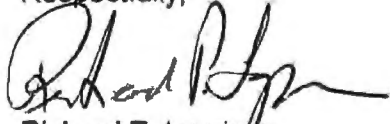
Byron Station, Unit 2  
Facility Operating License No. NPF-66  
NRC Docket No. STN 50-455

Subject: Licensee Event Report (LER) 455-2001-002-00

Enclosed is an LER involving the June 26, 2001, event involving a Unit 2 manual reactor trip initiation in advance of an automatic reactor trip from a low level condition in one of the Steam Generators. This event is reportable to the NRC in accordance with 10 CFR 50.73 (a)(2)(iv). Attachment A to this letter contains a summary of commitments made in the LER.

Should you have any questions concerning this matter, please contact P. Reister, Regulatory Assurance Manager, at (815) 234-5441, extension 2800.

Respectfully,



Richard P. Lopriore  
Site Vice President  
Byron Nuclear Generating Station

Enclosures: LER 455-2001-002-00  
Attachment A, "Regulatory Commitment"

cc: Regional Administrator, Region III, NRC  
NRC Senior Resident Inspector- Byron Station  
NRC Project Manager - NRR - Byron Station  
Office of Nuclear Facility Safety - Illinois Department of Nuclear Safety

IE22

**Attachment A**  
**Regulatory Commitment**

Exelon Generation Company (EGC), LLC, is committing to the following actions. Any other actions discussed in this submittal represent intended or planned actions by EGC. They are described to the NRC for the NRC's information and are not regulatory commitments.

<i>Regulatory Commitment(s)</i>	<i>Tracking Number</i>
1. The maintenance test reports and procedures for all valves with Bailey AV1 positioners, to include all FRVs, will be revised to include instruction to verify pilot valve retaining clip is installed correctly prior to final close of the positioner cover and to show the positioner retaining clip cups in the drawing.	00561461901
2. Operations Manager expectations for procedure readers will be reinforced to Operations personnel in upcoming simulator training.	00561461902

## LICENSEE EVENT REPORT (LER)

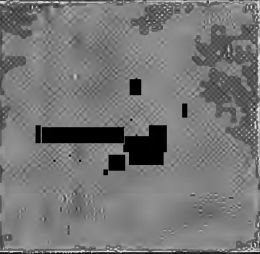
Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the information and Records Management Branch (t-6 f33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office Of Management And Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1) Byron Station, Unit 2

DOCKET NUMBER (2) 05000455

PAGE (3)  
1 of 6

TITLE (4) Manual Reactor Trip Due to a Decreasing Steam Generator Level Caused by a Failed Positioner on an Air Operated Feedwater Regulating Valve

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	26	2001		2001- 002 -00		08	27	2001	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		MODE 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)		100								
		<input type="checkbox"/> 20.2201(b)		<input type="checkbox"/> 20.2203(a)(3)(i)		<input type="checkbox"/> 50.73(a)(2)(iii)		<input type="checkbox"/> 73.71(b)		
		<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(3)(ii)		<input checked="" type="checkbox"/> 50.73(a)(2)(iv)		<input type="checkbox"/> 73.71(c)		
		<input type="checkbox"/> 20.2203(a)(2)(i)		<input type="checkbox"/> 20.2203(a)(4)		<input type="checkbox"/> 50.73(a)(2)(v)		<input type="checkbox"/> OTHER		
		<input type="checkbox"/> 20.2203(a)(2)(ii)		<input type="checkbox"/> 50.36(c)(1)		<input type="checkbox"/> 50.73(a)(2)(vii)		(Specify in Abstract below or in NRC Form 366A)		
		<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.36(c)(2)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)				
		<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.73(a)(2)(i)		<input type="checkbox"/> 50.73(a)(2)(viii)(B)				
		<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(ii)		<input type="checkbox"/> 50.73(a)(2)(x)				
LICENSEE CONTACT FOR THIS LER (12)										
NAME Penny Reister, Regulatory Assurance Manager								TELEPHONE NUMBER (Include Area Code) (815) 234-5441 X2800		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	SJ	FCV	Bailey	Yes						
SUPPLEMENTAL REPORT EXPECTED (14)										
YES (If yes, complete EXPECTED SUBMISSION DATE)				X NO		EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At 0609 hours on June 26, 2001, the Unit 2 licensed Nuclear Station Operator (NSO) observed the Unit 2 "D" Steam Generator (SG) level begin to decrease. He attempted to further open the Unit 2 Main Feedwater (FW) Regulating Valve (i.e., 2FW540) for the 2D SG. The valve did not respond and the 2D SG level continued to decrease and approached the low level reactor trip setpoint. In anticipation of the automatic trip signal, the NSO initiated a manual reactor trip signal at 0609 hours, prior to reaching the low level setpoint on 2D SG. The reactor trip system responded as expected and shutdown the reactor. The Auxiliary Feedwater (AF) System started as expected to supply auxiliary feedwater to the SGs. During the post reactor trip recovery, an unexpected reactor trip and AF actuation signal was generated when the B SG level was allowed to drop below the actuation setpoint. The 2B AF pump had just been secured and consequently, restarted. The cause of the 2FW540 valve closing was due to a retaining clip in the valve's positioner (i.e., Bailey AV1) not being installed correctly. The cause of the second unexpected actuation signal was due to failure of the licensed Unit Supervisor (US) to verbalize a procedure step concerning SG levels. Corrective actions include revising work instructions to ensure the retaining clip in Bailey AV1 positioners are installed correctly and counseling the US. There were no safety consequences impacting plant or public safety. This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv).

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the information and Records Management Branch (t-6 E33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office Of Management And Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Byron Station, Unit 2	STN 05000455	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 6
		2001	- 002	- 00	

(If more space is required, use additional copies of NRC Form 366A)(17)

**A. Plant Conditions Prior to Event:**

Unit 2 - Event Date/Time: June 26, 2001 / 0609 hours

Mode 1 - Power Operations, Reactor Power - 100%

Reactor Coolant System [AB]: Normal operating temperature and pressure

No structures, systems or components were inoperable at the start of the event that contributed to the event.

**B. Description of Event:**

At approximately 0609 hours on June 26, 2001, the Unit 2 licensed nuclear station operator (NSO) observed the Unit 2 "D" Steam Generator (SG) [SB] level begin to decrease. He attempted to increase Main Feedwater (FW) [SJ] flow by further opening the Unit 2 Main FW Regulating Valve (i.e., 2FW540) for the 2D SG. The valve did not respond and the 2D SG level was still decreasing and approaching the low level reactor trip setpoint. In anticipation of the automatic reactor trip signal, the NSO initiated a manual reactor trip signal at 0609 hours, prior to the 2D SG level reaching the low level setpoint.

The reactor trip system responded as expected and shutdown the reactor. The control room operators responded using the reactor trip response procedure, Unit 2 Byron Emergency Procedure, 2BEP ES-0.1, "Reactor Trip Response Unit 2." As an expected response to a reactor trip from 100% power, the SG water levels dropped below the low level setpoint for automatic Auxiliary Feedwater [BA] (AF) actuation. This resulted in the expected automatic initiation of both trains of AF.

The licensed Unit Supervisor (US) assumed the position of procedure reader for 2BEP ES-0.1. In accordance with step 7 of 2BEP ES-0.1, SG levels were to be controlled between 14% and 50%. Since flow from both trains of AF were not needed to control levels, the flow from the diesel driven 2B AF pump to the SGs was isolated and the flow from the motor driven 2A AF pump was throttled appropriately. The 2B AF pump remained running in recirculation mode.

At approximately 0638 hours, step 14 of 2BEP ES-0.1 was reached. This step has the operator check for stable plant conditions. This included maintaining the SG narrow range levels "at normal level." The US understood this to mean "normal" for current plant conditions, which he believed meant between 14% and 50%.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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**B. Description of Event, cont.:**

Since he knew the levels were in this range, he did not verbalize this step to the NSO, and no additional actions were taken regarding SG levels. However, the intent of the step was to control SG levels to the normal operational level of 60%. At 0654 hours, the US began the transition from 2BEP ES-0.1 to Unit 2 Byron General Procedure 2BGP 100-5, "Plant Shutdown and Cooldown."

The US, concerned over a potential inadvertent shutdown of the 2B AF diesel driven pump due to vortexing in the fuel oil day tank, directed a NSO to shutdown the 2B AF pump. Using the appropriate procedure for securing the 2B AF pump, the NSO verified that SG levels were greater than the low level setpoint for AF actuation (i.e., 36.3%) and at 0733 hours the 2B AF Pump was shutdown. The NSO did not recognize that the SG level in the 2B SG was close to the actuation setpoint and decreasing slowly. After approximately 10 seconds, the level in the 2B SG reached the low level setpoint and an unexpected reactor trip and AF actuation signal was generated. No equipment actuated except for the re-start of the 2B AF Pump which had just been shut down.

At 0652 hours on June 26, 2001, an Emergency Notification System (ENS) telephone notification to the NRC was completed in accordance with 10 CFR 50.72(b)(2)(iv) for the reactor trip and the expected automatic actuation of the AF system. At approximately 0733 hours, the ENS call was updated to report the second unexpected automatic actuation signal.

**C. Cause of Event:**

An investigation ensued into the cause of the 2FW540 valve unexpected failure. 2FW540 is an air operated valve with a Bailey AV1 positioner. The positioner cover for the valve was removed and it was observed that the retaining clip that holds the pilot valve stem in the pilot valve body was out of the beam assembly retaining cup and hanging down from the guide on the beam assembly. The purpose of the retaining clip is to hold the pilot valve stem in the pilot valve body. This allowed the pilot valve stem to hang half out of the pilot valve body. With the pilot valve uncoupled from the beam assembly, the positioner could no longer adjust the 2FW540 valve.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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**C. Cause of Event, cont.:**

The most probable failure mode for this event was that the retaining clip was not properly inserted into the beam assembly retaining cup and was hung up on the lip of the cup. Normal system vibrations eventually caused the clip to dislodge from the lip of the retaining cup. It is unknown how the retaining clip became hung up on the lip of the cup. This could have happened at the factory, during shipping, during the bench test or during the field test. The positioner was inspected with no damage or distortion found. The retaining clip throat dimensions were verified to be within the equipment manufacturer's tolerance.

On April 12, 2001, maintenance was performed on the 2FW540 valve. The valve had the positioner, booster, regulators, gauges and volume booster replaced; however, the pilot valve was not changed out. The retaining clip was not required to be verified to be seated properly prior to or after installing the positioner.

The root cause of the reactor trip was determined to be a failure to have specific instructions in the work package for the April 12, 2001, maintenance work package to inspect the retaining clip to assure that it is seated properly in the beam assembly cup.

During the investigation it was learned that in November of 1998, Surry Power Station experienced a similar reactor trip due to a mispositioned retaining clip on the pilot valve in their Feedwater Regulating Valves (FRV). The Surry Power Station Licensee Event Report (LER) for their trip was not reviewed at Byron Station for lessons learned. A contributing cause to this event is that our operating experience review program does not require a formal review of other site's LERs, nor did our reactor trip reduction program review reactor trip LERs from reactor designs dissimilar from Byron Station's design.

The root cause for the second unexpected reactor trip and AF actuation signal was determined to be a failure of the US to comply with the Operations Department expectation to verbalize all steps in 2BEP ES-0.1.

**D. Safety Analysis:**

There were no safety consequences impacting plant or public safety as a result of this event. The NSO appropriately tripped the reactor in anticipation of an automatic reactor trip from a low level condition in the 2D SG. The reactor trip



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TEXT CONTINUATION

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**D. Safety Analysis, cont.:**

system functioned as designed and shut down the reactor without incident. The second quarter 2001, Unit 2 NRC performance indicator for unplanned scrams per 7000 critical hours is in the green band at a value of 1.7. There were no safety consequences impacting plant or public safety as a result of the unexpected 2B AF Pump Start. The pump started as designed in response to low level in the SGs. No safety system functional failures occurred.

**E. Corrective Actions:**

A new positioner for 2FW540 was bench tested and the pilot valve and clip were replaced. The positioner was installed on 2FW540 valve and acceptably tested. The retaining clips in twelve of the same positioners on Unit 2 and 18 new positioners in stores were inspected and all retaining clips were found to be seated correctly. Based on the above inspection results and Unit 1 continuous operations of 250 days, it was decided that the Unit 1 valves with the same positioner did not need to be inspected at this time. The Unit 1 valves are scheduled to be inspected during the next outage.

The maintenance test reports and procedures for all valves with Bailey AV1 positioners, to include all FRVs, will be revised to include instruction to verify the pilot valve retaining clip is installed correctly prior to final closure of the positioner cover and to depict the positioner retaining clip cups in the drawing.

We will evaluate revising our Operating Experience Program to include other site's LERs in our operating experience program and reactor trip reduction program.

We will evaluate revising the FRV test report and procedure to provide checklists of other critical items that should be inspected prior to final close out of the positioner to prevent new failure modes that have not been identified.

Personal performance issues regarding the US have been addressed.

Operations Manager expectations for procedure readers will be reinforced to Operation personnel in upcoming simulator training.

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**F. Previous Occurrence:**

LER 455-2000-002-00, "Automatic Reactor Trip System Actuation from Low Steam Generator Level Caused by an Inappropriate Operator Response to a Failed Circuit Card in the Feedwater Flow Control Circuitry," dated August 25, 2000.

Corrective actions in this LER would not have been expected to prevent this event.

**G. Component Failure Data:**

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model Number</u>	<u>Mfr. Part Number</u>
Bailey	Positioner	AV1	N/A